

## CLAIMS

- 1 1. A method comprising  
2 passing an electrical current through a thermistor to raise its  
3 temperature above the temperature of oil flowing in pulses past the  
4 thermistor,  
5 measuring a change in temperature of the thermistor  
6 occurring with respect to one or more of the pulses,  
7 determining a level of oil flow corresponding to the  
8 measured change in temperature, and  
9 issuing a signal based on the determined flow level.
- 1 2. The method of claim 1 in which measuring the change in  
2 temperature comprises measuring a change in voltage across the  
3 thermistor over a period of time.
- 1 3. The method of claim 2 in which the period of time  
2 corresponds to different portions of at least one of the pulses.
- 1 4. The method of claim 2 in which the period of time begins  
2 at the start of one of the pulses and ends no later than the start of  
3 the next one of the pulses.
- 1 5. The method of claim 1 in which the thermistor is housed in  
2 a package having an area that yields an oil flow of 10 to 20 inches  
3 per second.

Attorney Docket 04513-023001

1 6. The method of claim 5 in which the area is in the range of  
2 0.0005 to 0.002 square inches exposed to the flowing oil.

1 7. The method of claim 1 in which the oil is flowing in a 2-  
2 cycle marine engine.

1 8. The method of claim 7 in which a signal indicative of the  
2 timing of the pulses is received from an electronic control module  
3 of the engine.

1 9. The method of claim 7 in which the signal based on the  
2 determined flow level is sent to an electronic control module of the  
3 engine.

1 10. The method of claim 1 in which the rate of pulses is as high  
2 as 5Hz.

1 11. The method of claim 1 in which the rate of pulses is as low  
2 as one pulse per day.

1 12. Apparatus comprising  
2 a coupling having (a) two open ends adapted for connection  
3 to upstream and downstream tubes of a pulsating oil circulation  
4 system of an engine and (b) a channel configured to direct the oil  
5 to flow past a thermistor connected to a sensing circuit,  
6 the sensing circuit comprising elements connected to  
7 determine a change in a voltage across the thermistor and to  
8 compare the change to a threshold.

1 13. The apparatus of claim 12 in which the sensing circuit  
2 includes a sample-and-hold circuit connected to store a voltage  
3 across the thermistor.

1 14. The apparatus of claim 12 in which the sensing circuit  
2 includes a delay circuit connected to provide timing signals for the  
3 period over which the change in voltage is determined.

1 15. The apparatus of claim 12 in which the sensing circuit  
2 comprises a microcontroller that includes an analog-to-digital  
3 converter.

1 16. The apparatus of claim 12 also including ports connected to  
2 carry timing and flow-state signals between the sensing circuit and  
3 a control circuit of the engine.

1 17. A marine engine comprising

2 moving parts arranged to be lubricated by oil delivered  
3 through a supply line from a supply of oil,

4 a pump configured to pump oil from the supply to the  
5 moving parts in pulses controlled by a controller, and

6 a sensor connected to receive pulses of the oil and to detect  
7 the oil flow state of the engine using a temperature sensitive  
8 electronic element and a circuit that analyzes an electrical  
9 parameter of the temperature sensitive element at times based on  
10 the pulses of the oil.

1 18. The engine of claim 16 in which the temperature sensitive  
2 electronic element comprises a thermistor.

1 19. The engine of claim 16 in which the circuit includes an  
2 electrical interface to a controller that controls the timing of the  
3 pulses.

1 20. A method comprising  
2 passing an electrical current through a thermo-electric  
3 sensor to raise its temperature above the temperature of a non-  
4 conductive or high resistance fluid flowing in pulses past the  
5 sensor,  
6 measuring a change in temperature of the thermo-electric  
7 sensor occurring with respect to one or more of the pulses,  
8 determining a level of fluid flow corresponding to the  
9 measured change in temperature, and  
10 issuing a signal based on the determined flow level.

1 21. The method of claim 20 in which the thermo-electric sensor  
2 comprises a thermistor.

20331301

Attorney Docket 04513-023001